

CONCEPTS

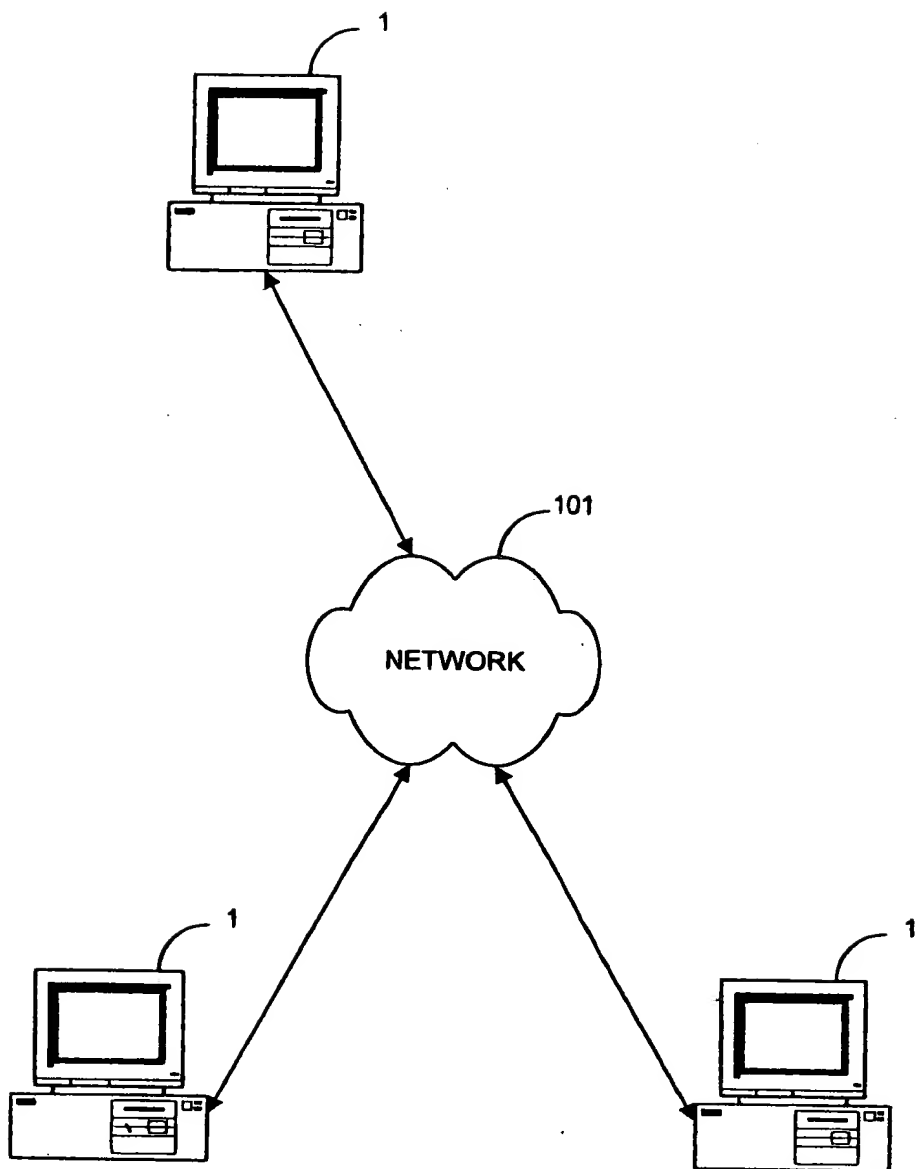
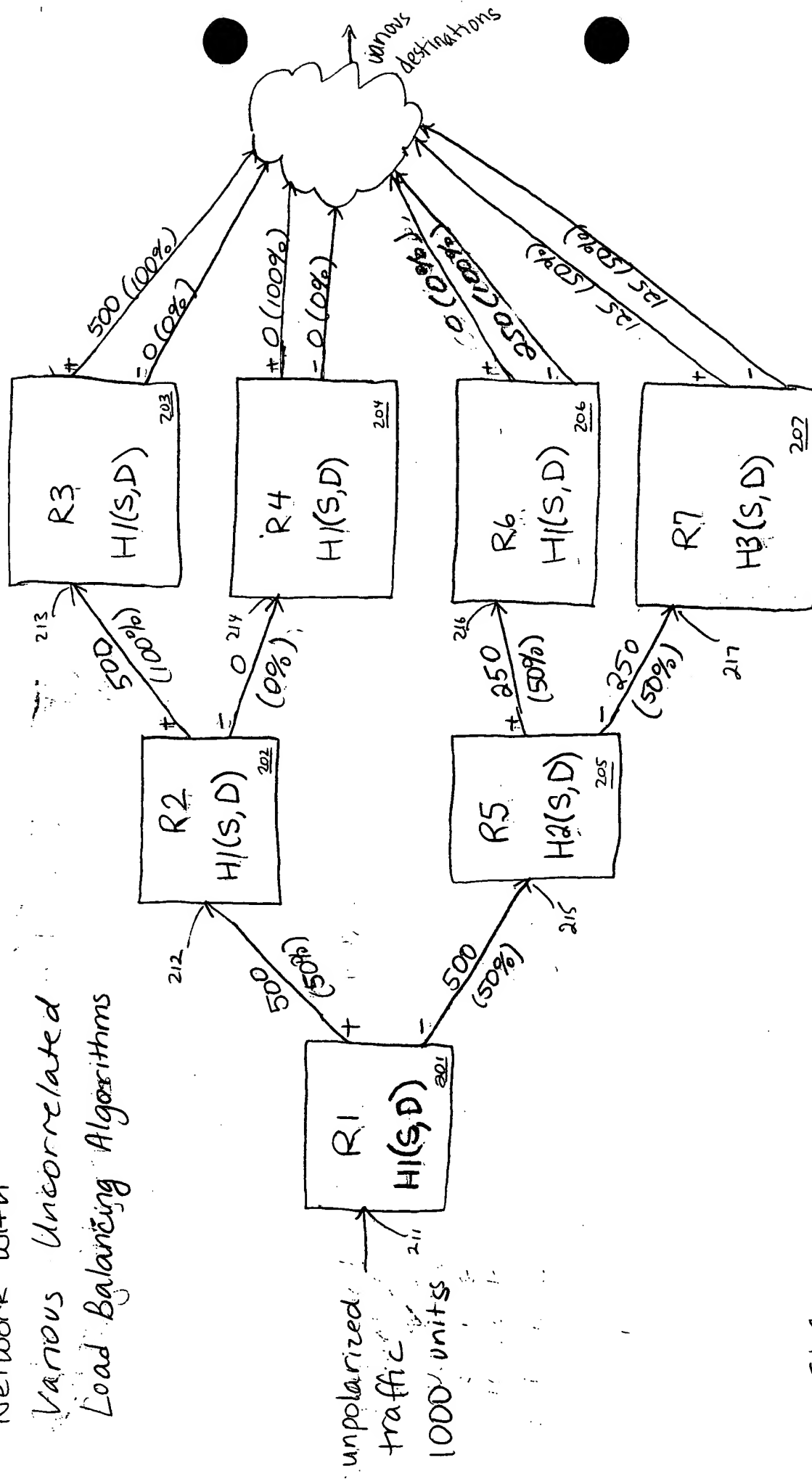


FIG. 1

Network with Various Uncorrelated Load Balancing Algorithms


$$\frac{1}{G} \alpha$$

SAMPLE HASH BUCKET SETUP

| | Hash Bin - Equal Load Balancing | | | | | | | | | | | | | | | |
|-------|---------------------------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|
| Npath | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 2 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| 3 | 0 | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 2 | x |
| 4 | 0 | 1 | 2 | 3 | 0 | 1 | 2 | 3 | 0 | 1 | 2 | 3 | 0 | 1 | 2 | 3 |
| 5 | 0 | 1 | 2 | 3 | 4 | 0 | 1 | 2 | 3 | 4 | 0 | 1 | 2 | 3 | 4 | x |
| 6 | 0 | 1 | 2 | 3 | 4 | 5 | 0 | 1 | 2 | 3 | 4 | 5 | x | x | x | x |

For the case of unequal load balancing, paths can be assigned to the hash bin taking account of the weightings. For example, for Npath=2, using one path twice as much as another, using 16 bins, the bins can filled in as {0,0,1,0,0,1,0,0,1,0,0,1,0,0,1,0}. This is not exact but matches the weights closely. Alternatively N_bin can be set to 15 and the bins filled in for example as {0,0,1,0,0,1,0,0,1,0,0,1,0,0,1}.

FIG. 3

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The following table shows the results of the regression analysis for the dependent variable $\ln Y$ (logarithm of the dependent variable) against the independent variables $\ln X_1$ (logarithm of the independent variable), $\ln X_2$ (logarithm of the independent variable), and $\ln X_3$ (logarithm of the independent variable). The results are presented for the years 1990, 1995, 2000, and 2005.



Load Balancing a Packet

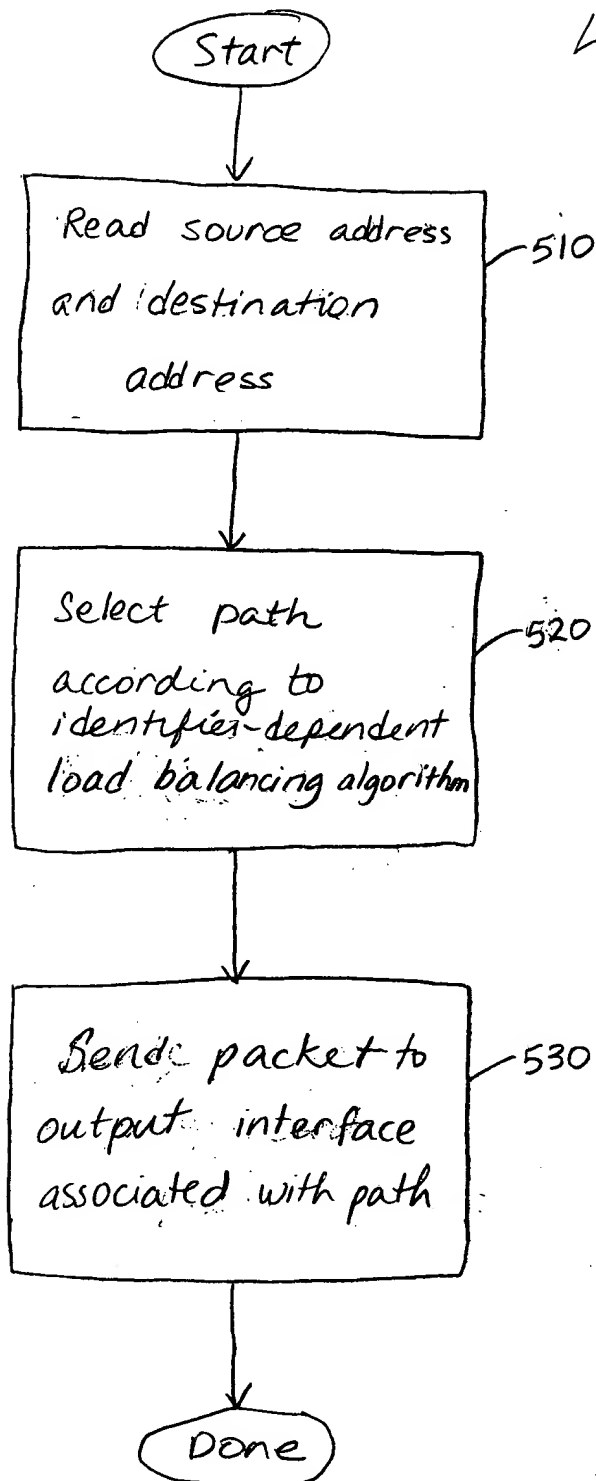


FIG. 5

Router

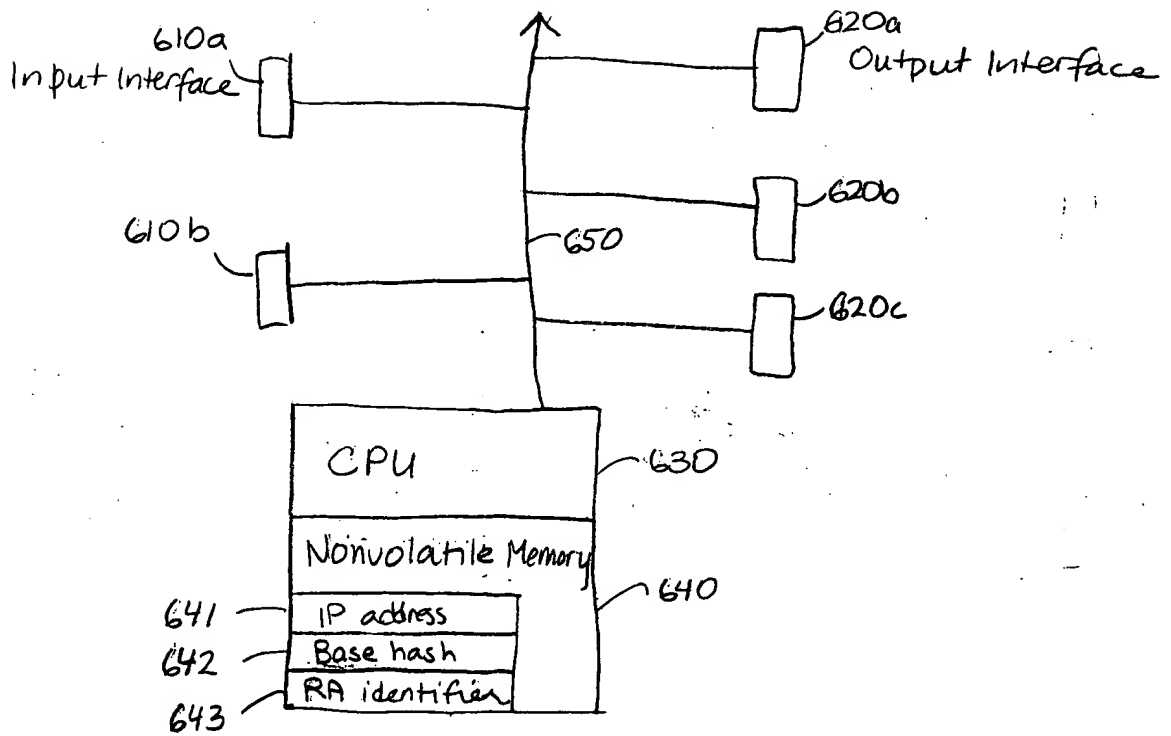


FIG. 6

Assigning an Identifier to a Router

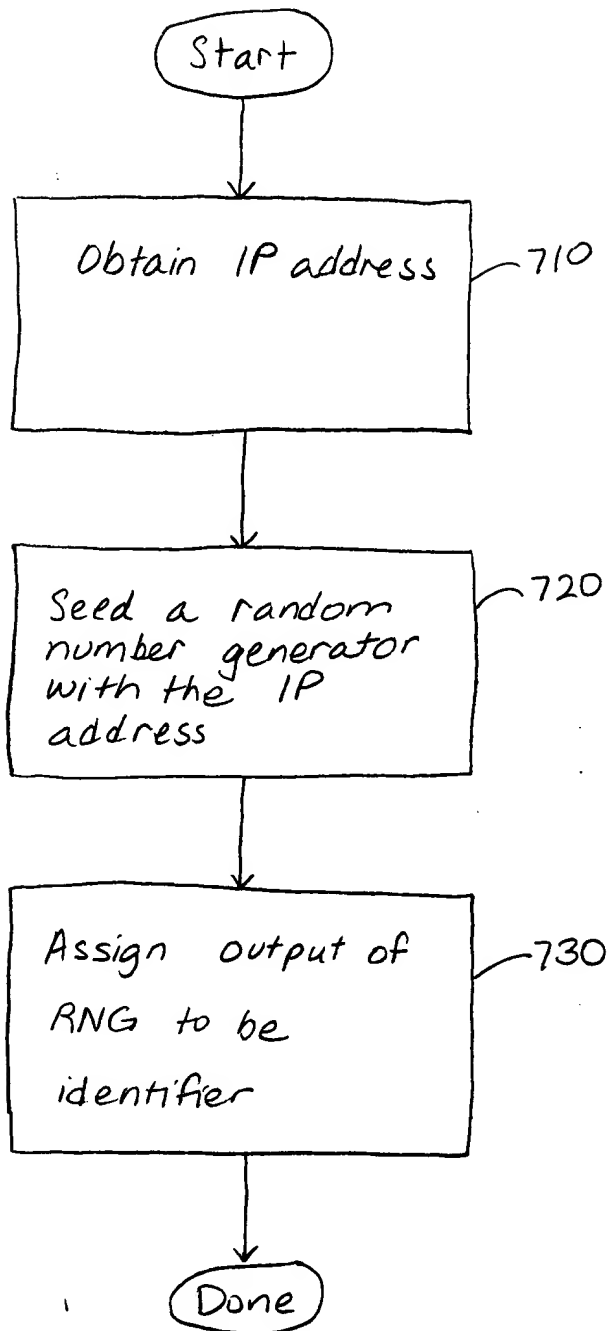
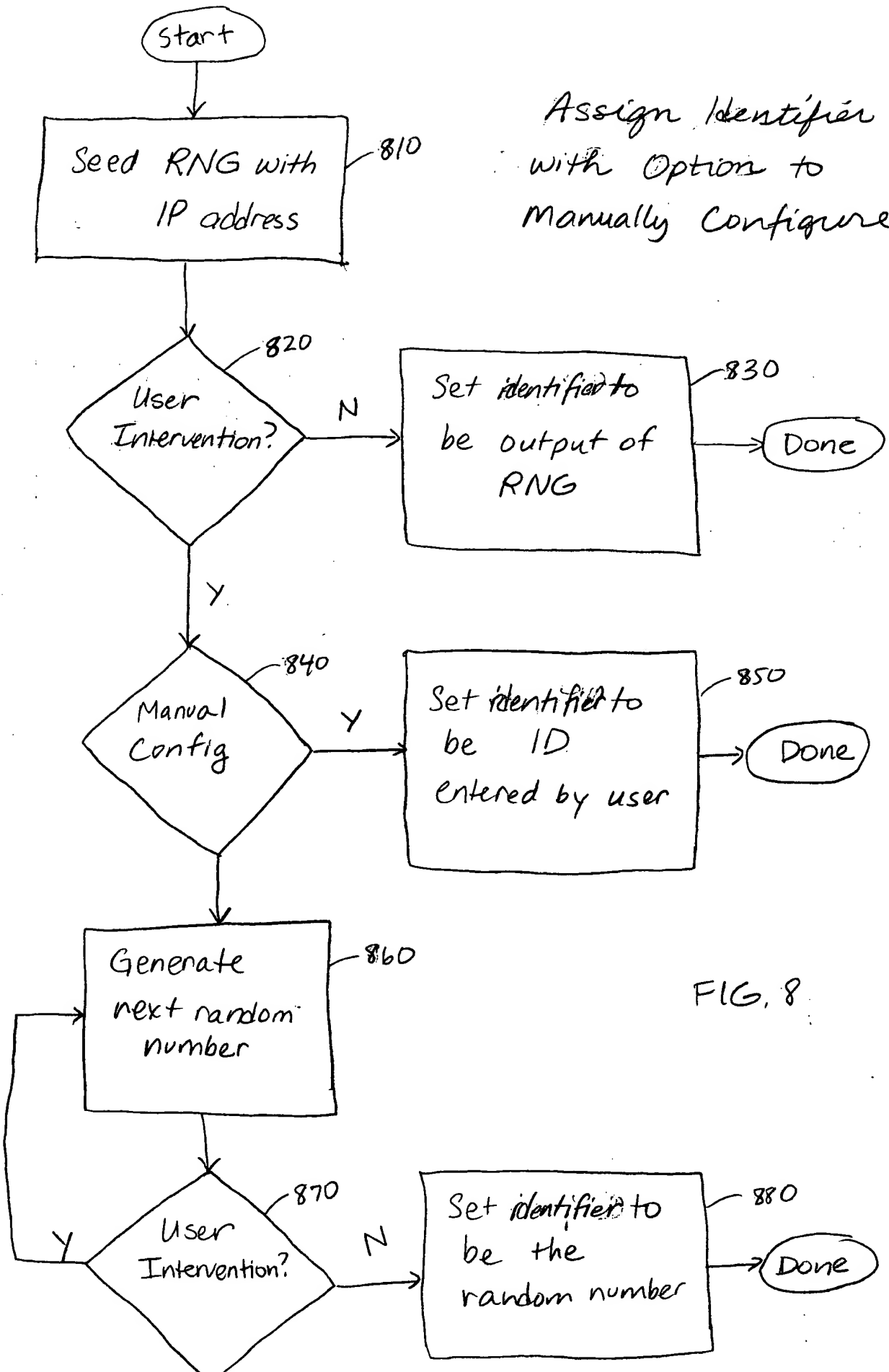


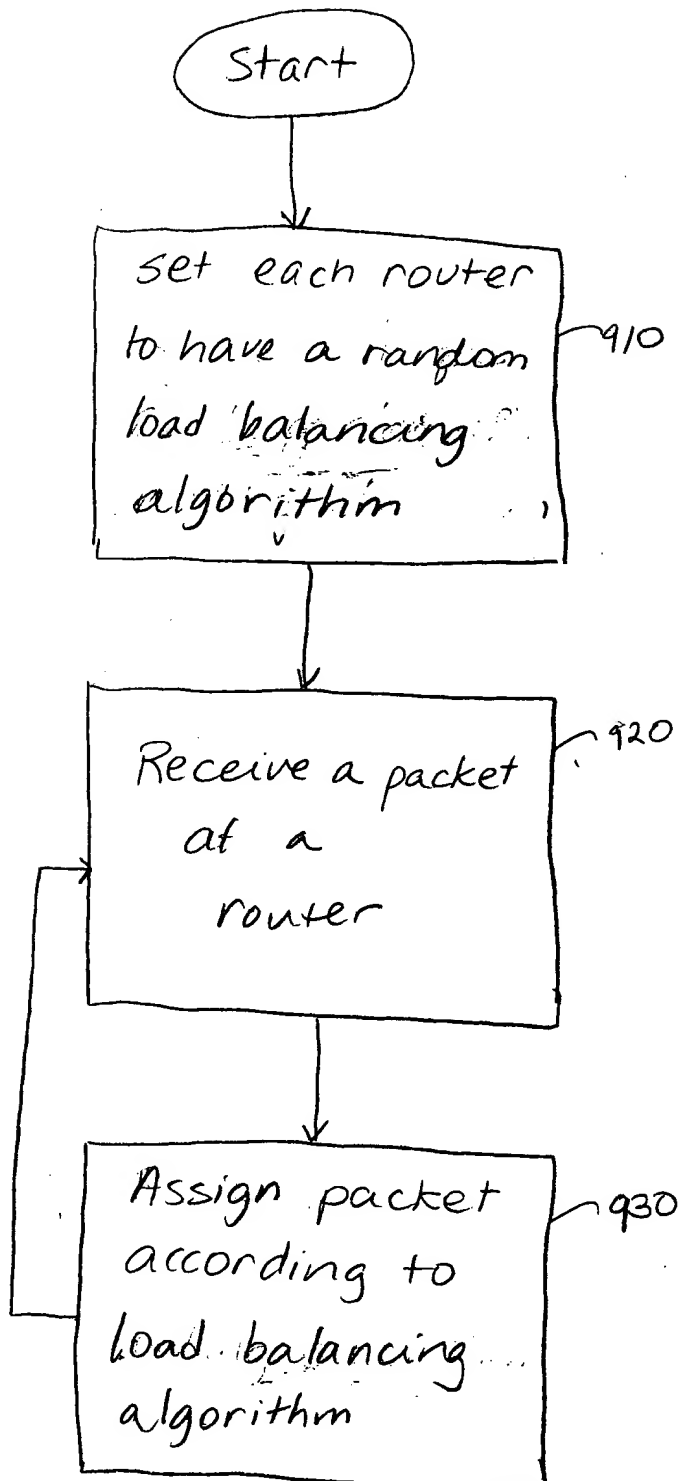
FIG. 7



Assign Identifier
with Option to
Manually Configure

FIG. 8

Providing Load Balancing
With Reduced
Polarization Effects in
a Network



Repeat Steps 820-830
until no packet
remains.

FIG. 9

Configuring a
Plurality of
Configurable Routers

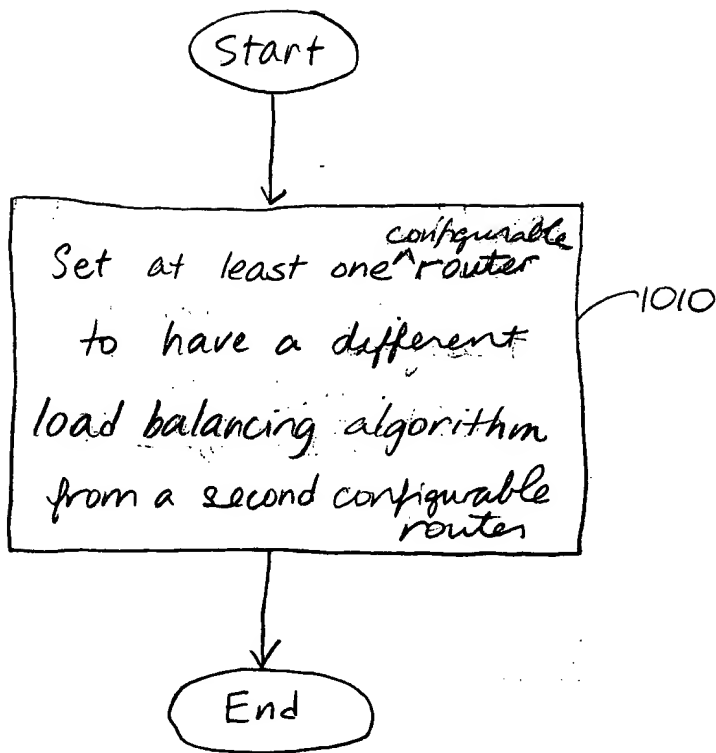


FIG. 10

Initial Hash Table

| Entry | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|-------|----|----|----|----|----|----|----|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 0 | 0 |
| 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 0 | 1 | 0 |
| 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 0 | 1 | 0 | 0 |
| 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 0 | 1 | 2 | 1 | 0 |
| 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 0 | 1 | 2 | 0 | 0 | 0 |
| ... | | | | | | | | | | | | | | | | |
| 65535 | 16 | 0 | 1 | 2 | 3 | 8 | 5 | 6 | 7 | 1 | 3 | 0 | 3 | 0 | 1 | 0 |

row
number

Each box is 4-bits of
a 64-bit entry

FIG.11

| Table of Shifts | |
|-----------------|-------------|
| index | shift value |
| 1 | 0 |
| 2 | 4 |
| 3 | 8 |
| 4 | 12 |
| 5 | 16 |
| 6 | 20 |
| 7 | 24 |
| 8 | 28 |
| 9 | 32 |
| 10 | 36 |
| 11 | 40 |
| 12 | 44 |
| 13 | 48 |
| 14 | 52 |
| 15 | 56 |
| 16 | 60 |

FIG. 12A

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| Table of Shifts | |
|-----------------|-------------|
| index | shift value |
| 1 | 0 |
| 2 | 0 |
| 3 | 0 |
| 4 | 0 |
| 5 | 0 |
| 6 | 0 |
| 7 | 0 |
| 8 | 0 |
| 9 | 0 |
| 10 | 0 |
| 11 | 0 |
| 12 | 4 |
| 13 | 0 |
| 14 | 0 |
| 15 | 8 |
| 16 | 12 |

FIG. 12B

Generating a Randomized Hash Table From an Initial Hash Table

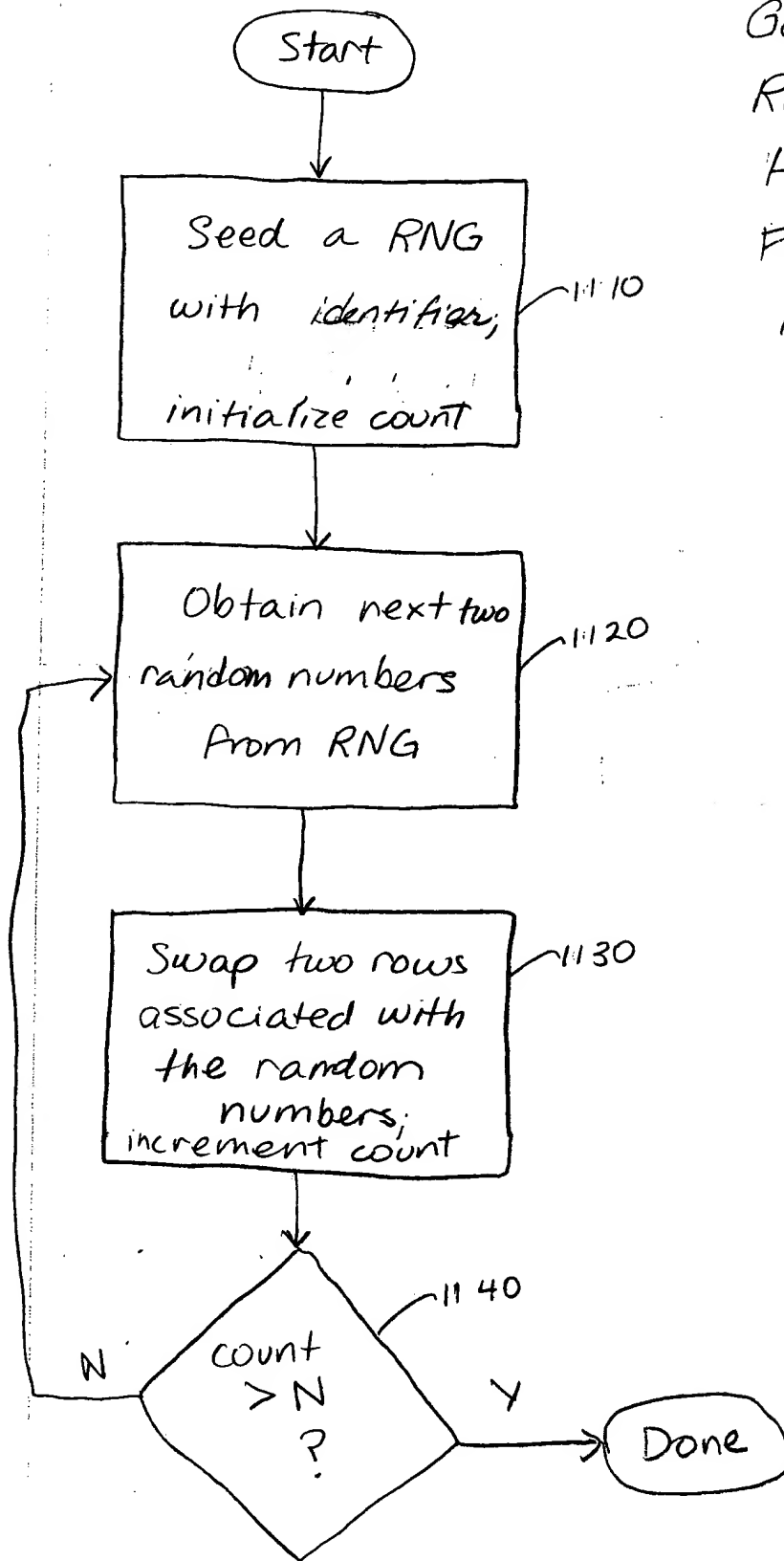


FIG. 13

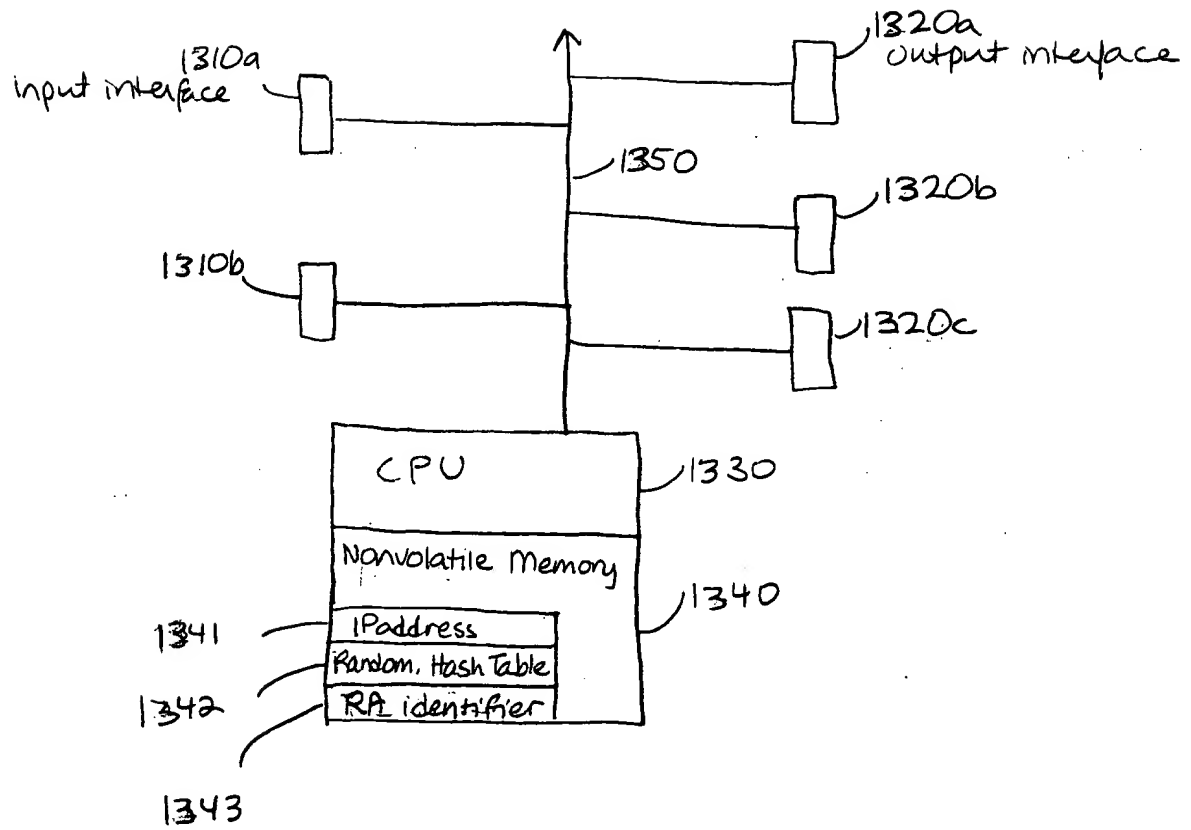


FIG. 14